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REDUCED RATE OF HIP FRACTURE IN PATIENTS WITH HIP OR KNEE OSTEOARTHRITIS

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Purpose: There are conflicting reports of the association between hip OA and hip fracture, and little is known of any possible relationship between knee OA and hip fracture. Hence our objective was to study the rate of hip fracture in hip and knee OA patients compared with the general population seeking health care using a comprehensive cohort study design.
Methods: Sweden has a publicly funded health care system with in- and outpatient health care utilization prospectively registered by the patient's personal identifier. We studied residents of the county of Skåne, Sweden by 31 Dec 2003 (total population 1.15 million) who sought health care at least once the following 4-years (2004-2007), thus being captured in the Skåne Health Care Register (SHCR). We identified all subjects aged 20 years or older with an ICD-10 code given by a physician for hip OA (M16), n=11 901, 57.1% women, or knee OA (M17), n=23 866, 58.8% women. To obtain hip fracture rates we calculated the person-time for each OA patient from the day of his/her first OA diagnosis within the period until the day of first hip fracture (S72.0, S72.1 or S72.2) or another censoring event (death, relocation, or end of study period by cross-referencing with the national population register). The person-time for each subject in the general population aged 20 years or older seeking health care (n=761 210, reference population) started to count by his/her first diagnostic code (any ICD-10 code) in the SHCR within the period until first hip fracture or another censoring event (in an identical fashion as for OA patients). We calculated the expected number of fractured OA patients by multiplying the person-time in OA patients with the rate of hip fracture in the corresponding stratum (age and sex) of the reference population. We calculated the expected (standardized) rate of hip fracture by using weights derived from the person-time from the OA patients. We then calculated standardized fracture-rate ratios by dividing the observed rate of hip fracture in OA patients by the expected rate. Thus, a fracture-rate ratio <1 equals a reduced rate of hip fracture among OA patients compared with the reference population.
Results: We observed 233 hip fractured hip OA patients (2.0%) while 271 (2.3%) were expected. We registered 398 hip fractured knee OA patients (1.7%) while 472 (2.0%) were expected. The observed rate of hip fracture in hip OA patients was 884 per 100 000 person-years (py) (expected rate 1028 per 100 000 py) and the observed rate in knee OA patients was 763 per 100 000 py (expected rate 904 per 100 000 py). The resulting age- and sex standardized fracture rate-ratio for having hip fracture in hip OA patients was 0.86 (95% confidence interval [95% CI] 0.75, 0.98) and in knee OA patients the ratio was 0.84 (95% CI 0.76, 0.93).

Table 1. Standardised Hip Fracture-Rate Ratio (95% Confidence Interval) Compared to General Population

	Total	Men	Women
Hip OA (n=11,901)	0.86 (0.75, 0.98)	0.83 (0.63, 1.07)	0.87 (0.75, 1.01)
Knee OA (n=23,866)	0.84 (0.76, 0.93)	0.99 (0.81, 1.19)	0.80 (0.71, 0.90)

Conclusions: There seems to be an inverse relationship between knee and hip OA and incident hip fracture except for male knee OA patients. Any causal mechanism(s) remain unclear, but could hypothetically be related to increased frequency of obesity in OA patients and (or) increased bone mineral density making OA patients in general less likely to fracture the hip when falling.

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THE ASSOCIATION BETWEEN RADIOGRAPHIC KNEE OSTEOARTHRITIS AND KNEE SYMPTOMS, FUNCTION, AND QUALITY OF LIFE 10-15 YEARS AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Purpose: The aim of this study was to investigate the associations between radiographic tibiofemoral knee osteoarthritis (OA) and knee pain, symptoms, function, and knee-related quality of life (QOL) 10-15 years after anterior cruciate ligament (ACL) reconstruction.
Methods: Two hundred and fifty-eight subjects were consecutively included at the time of ACL reconstruction and followed-up prospectively. The Knee Injury and Osteoarthritis Outcome Score (KOOS) was included at the 10-15 year follow-up to evaluate knee pain, other symptoms (symptoms), activities of daily living (ADL), sport and recreation (Sport/rec), and QOL. Each subscale includes a 0-100 scale, where 0 indicates extreme knee problems and 100 indicates a normal knee. Standing semi-flexed radiographs using SynaFlexer frame (Synarc Inc, Denmark) were taken 10-15 years after the ACL reconstruction and graded with the Kellgren and Lawrence (K&L) classification (grade 0-4). Two multivariate regression models were used to assess the association between each KOOS subscale as dependent variables and K&L grades as independent variables. The first model included the traditional cutoff (K&L $\geq$ grade 2 vs $<$ grade 2) for radiographic OA with adjustment for gender, age, and body mass index. The second model included each K&L grade as a dichotomous independent variable compared to a reference group (K&L grade 0/1) with adjustment for gender and age.
Results: Two hundred ten subjects (81%) consented to participate at the 10-15 year follow-up. Radiographic knee OA was detected in 71%; 47% had mild OA (K&L grade 2), 19% had moderate OA (K&L grade 3), and 5% had severe OA (K&L grade 4). No significant associations were detected between radiographic knee OA (K&L grade $\geq$2) and pain, function, or QOL, respectively, but subjects with radiographic knee OA showed significantly increased symptoms (Beta -5.7, SE 2.5, p= 0.03). Severe radiographic knee OA was significantly associated with increased pain (Beta -15.8, SE 4.6, p=0.001), increased symptoms (Beta -15.4, SE 5.1, p= 0.003), impaired ADL (Beta -7.1, SE 3.3, p=0.035), impaired Sport/Rec (Beta -24.5, SE 7.9, p=0.002), and reduced QOL (Beta -21.1, SE 7.2, p=0.004) (Figure 1).

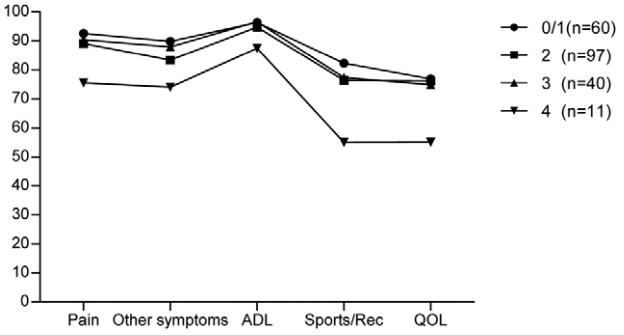

Figure 1. Mean values for the subscales of the Knee injury and Osteoarthritis Outcome Score for each Kellgren and Lawrence grade (0-4).

Conclusions: No significant associations were detected between radiographic knee OA (K&L grade $\geq$2) and pain, function, or QOL, respectively, except for symptoms. But subjects with severe radiographic knee OA had significantly increased pain and symptoms, and impaired function compared to those without radiographic knee OA 10-15 years after ACL reconstruction. Future research should emphasize treatment methods to reduce the development of radiographic knee OA, but also treatment methods targeting reducing symptoms and increasing function.

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FACTORS ASSOCIATED WITH LOSS OF KNEE CARTILAGE VOLUME IN OLD ADULTS: A PROTECTIVE EFFECT OF LOW-DOSE ASPIRIN USE

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Purpose: To determine factors associated with knee cartilage loss in older adults.
Methods: A total of 419 randomly selected subjects (mean 62 years, range 51-81, 50% female) were studied at baseline and 2.9 years later. T1-weighted fat-suppressed MRI of the right knee was performed to determine knee cartilage volume and defects.
Height, weight and radiographic osteoarthritis (OA) were measured by standard protocols. Fat mass was measured by dual energy x-ray absorptiometry (DXA).

Results: Tibial cartilage volume decreased by 2.0-2.7% per annum. In multivariable analysis, change in medial tibial cartilage volume per annum was associated with age (β: -0.11% per year, 95%CI: -0.18%, -0.05%), female sex (β: -2.18% vs males, 95%CI: -3.69%, -0.66%), body mass index (β: -0.14% per kg/m^2, 95%CI: -0.25%, -0.02%), percentage total body fat (β: -0.16% per %, 95%CI: -0.27%, -0.05%), percentage trunk fat (β: -0.08% per %, 95%CI: -0.16%, -0.002%), medial tibial cartilage defects (β: -0.77%, 95%CI: -1.31%, -0.23%), radiographic OA (β: -1.22%, 95%CI: -2.25%, -0.19%) and low-dose aspirin use in last month (β: +1.50% vs non-use, 95%CI: -0.05%, +3.05%). Change in lateral tibial cartilage volume was also significantly associated with sex, lateral tibial cartilage defects and radiographic OA.
Conclusions: This study is the first to report that body fat is associated with increased, and low-dose aspirin use is associated with decreased cartilage loss. It confirms that risk factors such as age, female sex, body mass index and radiographic change are associated with cartilage loss. Strategies such as reducing body fat and use of low-dose aspirin may prevent knee cartilage loss in older people.

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MUSCLE STRENGTH AND PROPRIOCEPTION IN PATIENTS WITH KNEE OA - ARE THEY RELATED/CORRELATED?

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Purpose: Several studies have shown both diminished muscle strength and a poor proprioception in patients with knee osteoarthritis (OA) compared to healthy controls. Since proprioception for a big part depends on the input from the muscle spindles it was hypothesized that poor muscle strength is related to a poor proprioception or vice versa.
Methods: Proprioception encompasses the sense of joint position sense (JPS) and the sense of motion (the threshold to detection of a passive movement, TDPM). In a group of patients with knee OA (n=26, average age = 61.5 [14.2]) isokinetic muscle strength was measured together with the TDPM and JPS. The TDPM was earlier shown to be impaired also in the elbow in this group of patients with knee OA, indicating that impaired proprioception may be a central problem, and not related to the involved joint alone. Therefore we measured both the elbow and the knee. JPS was measured as the participant's ability to actively reproduce the position of the elbow and knee joints. TDPM was measured as the participant's ability to recognize a passive motion of the elbow and knee joints. The absolute error (AE) for JPS (i.e., absolute difference in degrees between target and estimated position) and for TDPM (i.e., the difference in degrees at movement start and response when recognizing the movement) was calculated. Maximum knee extension and flexion, in addition to elbow extension and flexion strength were measured isokinetically at 60 degrees per second (Biodex System 3 PRO dynamometer).
Results: No correlations between maximum muscle strength and JPS were observed for neither the knees nor the elbows. A significant positive correlation between elbow TDPM and maximum elbow flexion strength, was observed (Table 1). In addition, a significant positive relationship between noninvolved knee TDPM and knee flexion strength was observed (Table 2).

Table 1. Elbow

	TDPM - elbow right	TDPM - elbow left
Elbow extension strength - left	r=-0.381 (P=0.020)	r=-0.400 (P=0.016)
Elbow extension strength - right	r=-0.409 (P=0.012)	r=-0.418 (P=0.011)
Elbow flexion strength - left	N.S.	N.S.
Elbow flexion strength - right	N.S.	N.S.

Table 2. Knee

	TDPM - knee involved	TDPM - knee noninvolved
Knee extension strength - involved knee	N.S.	N.S.
Knee extension strength - noninvolved knee	N.S.	N.S.
Knee flexion strength - involved knee	N.S.	r=-0.666 (P=0.013)
Knee flexion strength - noninvolved knee	N.S.	r=-0.705 (P=0.007)

Conclusions: The results showed that muscle strength in the triceps brachii is related to poor movement detection over the elbow, but surprisingly not, no clear relationship between the OA knee muscle strength and the poor TDPM observed in both involved and non-involved knees.

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CLINICAL AND RADIOGRAPHIC DISTRIBUTION OF STRUCTURAL DAMAGE IN EROSIVE AND NON EROSIVE HAND OSTEOARTHRITIS

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Purpose: The assessment of hand osteoarthritis (HOA) involves clinical and radiological outcome measures. Few studies evidenced an association between radiological damage (in particular the osteophytes, evaluated by the Atlas and the Kellgren-Lawrence's score - K&L) and joints with Heberden's (H) and Bouchard's (B) nodes. The aim of our study was to investigate radiological and clinical structural damage distribution in patients with the erosive and non erosive subsets of HOA.
Methods: 446 patients with HOA [233 with erosive HOA (EHOA) and 213 with non-EHOA] were evaluated. Clinical (presence of B and H nodes) and radiographic (K&L and Kallman's scores obtained from anteroposterior radiographs of both hands) structural damage from all patients was recorded.
Results: Higher values of both radiological scores were observed mostly in 2-3 e 5 distal interphalangeal (DIP) joints, while the K&L was more severe in the 2 and 3 proximal interphalangeal (PIP) joints and the Kallman in the 3 and 4 ones. H nodes were detected more frequently in the 2-3 and 5 DIP joints while B nodes were more evenly distributed in PIP joints. When we compared values of Kallman's score in joints with and without H/B nodes, we found higher scores in joints with H/B nodes: Kallman's values were 5.20±2.27 (95%CI: 5.14 - 5.27) vs 3.07±1.72 (95%CI: 3.02 - 3.12), $p<0.0005$. K&L values were also higher in joints with H/B nodes (data not shown). Dividing patients into erosive and non erosive subsets, both H's and B's nodes were more frequent in EHOA patients and this group had a greater involvement of the carpo-metacarpal (CMC)-1 joint.
Finally, we found an association between the presence of H-B nodes and the occurrence of central erosion type of damage (sea-gull/saw-tooth patterns).
Conclusions: Our results show that joints with H's and B's nodes are associated to more severe structural damage. Patients with EHOA have H/B nodes more frequently than non erosive patients and their joints show more higher K&L's and Kallman's scores. Finally, involvment of CMC-1 was more frequent in EHOA.

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THE DELAWARE OSTEOARTHRITIS PROFILE: A COMPREHENSIVE EVALUATION OF DISABILITY AND RECOVERY

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Purpose: The purpose of the study was to create normative values for the Delaware Osteoarthritis Profile - a comprehensive set of tests to assess functional performance and self-perceived functional ability in persons with knee osteoarthritis (OA). Normative values could be used to evaluate disability, predict the future need for total knee arthroplasty (TKA) and assess recovery after TKA for individual patients.
Methods: The Delaware Osteoarthritis Profile was used to assess function, self-perceived functional ability, quadriceps strength and knee range of motion in persons without knee pathology, persons with moderate OA and end-stage OA, as well as in in persons 1 month, 6 months, 12 months and 24 months after TKA. Normative values were created for each of these groups based on values from a large dataset from several clinical studies. The Delaware Osteoarthritis Profile consisted of several tests and measures that are reliable and valid in persons with knee pain and pathology, including the Timed Up and Go, Stair Climbing Task, 6 Minute Walk, Knee Outcome Score - Activities of Daily Living Subscale, Short Form 36 Physical Component and Mental Component Scales, Maximal Voluntary Isometric Knee Extension Strength Test, Active Knee Flexion and Extension Range of Motion, and Unilateral Balance Test.
Results: The scores for the healthy control subjects were greater than the scores of the subjects with OA or subjects after TKA (Tables 1-3). Physical performance and self-perceived functional ability were reduced as the severity of OA increased. Scores on the self-perceived functional questionnaires did not change consistently with the objective functional measurements, particularly the first month after TKA. One month after